CURRICULUM VITAE

RAE SILVER
Helene L. and Mark N. Kaplan Professor of Natural and Physical Sciences

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Educational Background

Degree	Institution	Year	Field
B.Sc. Honours	McGill University	1966	Physiol. Psychol.
M.A.	City College of the City University of New York	1970	Biopsychology
Ph.D.	Institute of Animal Behavior Rutgers - The State University Advisor: Daniel S. Lehrman	1972	Biopsychology

Academic Positions

1997-present: Professor Psychology in the Department of Anatomy and Cell Biology, Columbia College of Physicians and Surgeons

1995-present: Professor of Psychology, Psychology Department, Columbia University

1990-present: Helene L. and Mark N. Kaplan Professor of Natural & Physical Sciences 1990
Psychology Department, Barnard College
1982: Professor of Psychology at Barnard College of Columbia University
1988-1989: Chair, Psychology Department
1979-1982: Associate Professor and Chair, Psychology Department
1976-1979: Assistant Professor
1974-1976: Research Associate
The American Museum of Natural History
Central Park West at 79th Street
New York, NY 10024
1974-76: Hunter College of the City University of New York
New York, NY 10021
Assistant Professor
1972-1974: Rutgers - The State University

Psychology Department
Newark, NJ 07102
Assistant Professor

Grants

Research Grants

NIH grant NS37919
Physiological dissection of the SCN
1998-2002

NIMH Grant MH 29380 1976-2001.
Factors influencing parental behavior.

NIH NS41069 2000-2005
The Function(s) of AVP & PKCbetal in the SCN of mice
Alaskan Basic Neuroscience Program (SNRP Grant: PI Dr. L. Duffy)

NIH 2001-2006
Molecular Physiology of Circadian Rhythms (PI Dr. D. McMahon)

NIMH Grant MH 54088
Mast cells-Function in Normal Adult Brain. (PI: Dr. A-J Silverman)
1996-2005

NSF-CNRS Grant 1998-2001
Brain mast cells in sheep

NSF 1995-1998
Brain photoreceptors|

AFOSR Grant.
Efferent signals of the SCN. 1996-99
NSF SGER award
Brain mast cells.
1994-1995

NATO Grant 1992 (with Dr. Serviere, INRA, France)
NATO Grant 1994 (with Dr. Serviere, INRA, France)

AFOSR Grant. 1992-1995
Efferent signals of the SCN.

Irna and Jacob Michael Visiting Professor 1989.
Weizmann Institute, Israel.

NIH Grant NS24292.
Circadian rhythms: restoration by neural grafts. 1987-1995.

Whitehall Foundation Grant.
Encephalic photoreceptors. 1986-1987.

Whitehall Foundation Grant. 1982-1985.
Neural mechanisms of parental behavior.

NSF Grant TF1 8100678. 1981
Acquisition of a centrifuge and accessories.

NSF Grant BNS 7816287. 1978
Wild doves in Africa: Field validation of laboratory studies.

Educational and Training Awards:
American Physiological Society Award to sponsor of 2 undergraduate students 2002
NIMH Grant 2002-2004
Support for SRBR meeting (pending 0.7 percentile)

NSF Grant: Workshop on "The CSF as a communication pathway of the brain"
Workshop held in association with the Society for Neurosciences meeting 1998.

NSF Grant 1996
Support for student travel to Behavioral Endocrinology Conference in Turin

NASA Grant 1997
Student Research Support

ONR Grant NOO14-91-5-1314.
Predictions of scientific career orientation among able college women. 1990-1994.

NSF CAUSE Grant.
Comprehensive improvements in curriculum
and instructional technology (Co-Director). 1981-1984.

NSF Grant SED 7712124 and 79-09032.
Development of the instructional films in ethology:
Behavior of the ring dove. 1977-1982.

Service to the Scientific Community

Society for Neuroscience Program committee 2001-2004
(Chair – Theme E, Autonomic and Limbic System),
Committee member NASA: International Space Station Cost and Management Evaluation *Task Force* 2001
Panel member Ford Foundation Minority Fellowship Review panel 2001
President: Society Research in Biological Rhythms 2000-2002
Special emphasis panel member NIH IFCN2 2000-2001
Advisory Board: International Society for Chronobiology 1999-2005

Program Chair: International Congress of Chronobiology, Washington DC 1999
Program Chair: Society for Behavioral Neuroendocrinology 1999
Chair: Search Committee for editor of Journal Hormones and Behavior 1997
Chair: Search Committee for editor of Journal of Biological Rhythms 1999
Neuroscience Working Group: Integrative, Regulatory and Behavioral Neurosciences - charged with writing first draft of charter for Neuroscience study sections March, 1997.
Committee of visitors for the Neuroscience Cluster NSF, June 1995.
Chair: External Advisory Committee, NSF Center for the Study of Biological Rhythms, University of Virginia, 1991-2002.
Panel Member, NSF, Undergraduate Education and Instrumentation. 1995
Panel Member, NIMH Psychobiology, Behavior, and Neurosciences, 1994-1996.
Panel Member, NIMH Behavioral Neurosciences 1993-1994.
Panel Member, Sensory & Integrative Systems, NSF, 1987-1989.
Panel Member, Psychobiology, NSF, 1986-1987.
Panel Member, Neuropsychology Panel, NIMH, 1979-1983.
Society for Behavioral Neuroendocrinology, Advisory Board Member 1996-
Program Chair, American Psychological Association 1994
Member-at-Large, American Psychological Association 1994-1997
Member-at-Large: Society for Research in Biological Rhythms, 1994-1996.
Member, Advisory Committee, Society for Research in Biological Rhythms, 1992-1994.
Rapporteur, American Physiological Society, Conference on "Understanding the Biological Clock - from Genetics to Physiology", 1995.
Advisory Committee Member, International Ornithological Society, 1993-1997.
American Ornithological Union, Elective Member, 1994
Member, Search Committee: Director of the Institute of Animal Behavior-Rutgers University, 1989.
Society for Chronobiology, Member at Large 1996

Service to Educational Community:
1990: Selection committee for Chair of Institute of Animal Behavior
1998: Review of Psychology and Computer Science Departments at University of Toronto
2001: Review of Biology Departments of Stern College and Yeshiva University
2002: Review of Psychobiology Program at Hunter College

Editorial Board
Journal of Comparative Psychology 1985-1989

Journal for Research in Biological Rhythms-1995-present
Hormones and Behavior 1996-2000
Biological Rhythm Research 1997-present

Service to Barnard/Columbia

Member, Animal Care Committee, Columbia University,
1986-present.
1998-present: Barnard Medalist committee
Chair, Provost Search Committee,1995
Committee on Instruction, 1992-1994.
(First) Director of Quantitative Reasoning Program, also established First Academic Computer Centers at Barnard
1983-1988
University Ad Hoc Committees (approximately 1/year since 1982)
Member, Faculty Planning Committee,
1984-1987.
Member, Faculty Executive Committee,
1983-1984.
Member, Executive Committee, Health and Society Program,
1983-1986.

Professional Associations

Fellow: American Association for the Advancement of Science
American Ornithological Union (Fellow, 1994)
American Physiological Society
American Psychological Society (Charter Member and Fellow 1989)
American Psychological Association (Fellow-Division 6, 1984)
Endocrine Society
International Ornithological Society
Society for Behavioral Neuroendocrinology
Society for Neurosciences
FASEB
Society for Research in Biological Rhythms
International Society for Chronobiology

Scientific publications (arranged chronologically)

1. Witkovsky, P., R. Silver, and H.P Zeigler (1973). The nucleus basalis of the pigeon: A single unit analysis. J. Comp. Neurol. 147: 119-128.
2. Silver, R. and P. Witkovsky (1973). Functional characteristics of single units in the spinal trigeminal nucleus of the pigeon. Brain, Behavior and Evolution 8: 287-303.
3. Silver, R., H.H. Feder, and D.S. Lehrman. (1973). Situational and hormonal determinants of courtship, aggressive and incubation behavior in male ring doves (*Streptopelia risoria*). Horm. Behav. 4**:** 163-172.
4. Silver, R. and H.H. Feder. (1973). Role of gonadal hormones in incubation behavior of male ring doves (*Streptopelia risoria*). J. Comp. Physiol. Psychol. 84: 464-471.
5. Silver, R. and H.H. Feder. (1973). Inhibition of crop sac growth by dexamethasone in ring doves (*Streptopelia risoria*). Endocrinol. 92: 1568-1571.

6. Silver, R. and J. Buntin. (1973). Role of adrenal hormones in incubaton behavior of male ring doves (*Streptopelia risoria*). J. Comp. Physiol. Psychol. 84: 453-463.
7. Silver, R., C. Reboulleau, D.S. Lehrman and H.H. Feder. (1974). Radioimmunoassay of plasma progesterone throughout the reproductive cycle in the male and female ring dove (*Streptopelia risoria*). Endocrinol. 94: 437-444.
8. Feder, H.H. and R. Silver. (1974). Comparative thresholds of estrone, estriol and estradiol for the activation of lordosis in female guinea pigs. Physiol. and Behav. 13: 251-255.
9. Cheng, M.F. and R. Silver. (1975). Estrogen- progesterone regulation of nest-building and incubation behavior of female ring doves (*Streptopelia risoria*). J. Comp. Physiol. Psychol. 88: 256-263.
10. Silver, R. and C. Barbiere. (1977). Readiness to court and to incubate during the reproductive cycle of the male ring dove. Horm. Behav. 8: 8-21.
11. Silver, R. (1977). Effects of the anti-androgen cyproterone acetate on reproduction in male and female ring doves. Horm. Behav. 9: 371-379.
12. Feder, H.H., C. Reboulleau, D. Goodwin, A. Storey, and R. Silver. (1977). Testosterone and "5a-dihydrotestosterone" levels in peripheral plasma of male and female ring doves (*Streptopelia risoria*) during the reproductive cycle. Biol. Reprod. 16: 666-667.
13. Silver, R. (ed.) (1977). *Parental Behavior in Birds.* Dowden, Hutchinson, and Ross, Stroudsburg, PA.
14. Silver, R. (1978) The parental behavior of doves. American Scientist, March, 209-213.
15. Silver, R., M. O'Connell and R. Saad (1979). Androgens in birds. In: *Endocrine Control of Behavior*. Edited by C. Beyer, Plenum Press: New York, pp. 233-278.
16. Silver, R. and H.H. Feder (1979). *Hormones and Reproductive Behavior*, W.H. Freeman and Co.
17. Wallman, J., M.B. Grabon and R. Silver. (1979). What determines the pattern of sharing incubation and brooding in ring doves? J. Comp. Physiol. Psychol. 93: 481-492.
18. Silver, R., A.R. Goldsmith, and B.K. Follett. (1980). Plasma luteinizing hormone in male ring doves during the breeding cycle. Gen. Comp. Endocrinol. 42: 19-24.
19. Silver, R. and M.J. Gibson. (1980). Termination of incubation in doves: Influence of egg fertility and absence of mate. Horm. Behav. 14: 93-106.
20. O'Connell,M.E., R. Silver, H.H. Feder and C. Reboulleau. (1981). Social interactions and androgen levels in birds. II. Social factors associated with the decline in plasma androgen levels in the male ring dove (*Streptopelia risoria*). Gen. Comp. Endocrinol. 44**:** 464-469.
21. O'Connell, M.E., C. Reboulleau, H.H. Feder and R. Silver (1981). Social interactions and androgen levels in birds. I. Female characteristics associated with increased plasma androgen levels in the male ring dove (*Streptopelia risoria*). Gen. Comp. Endocrinol. 44: 454-463.
22. Goldsmith, A.R., C. Edwards, M. Koprucu and R.Silver (1981). Concentrations of prolactin and luteinizing hormone in relation to incubation and development of the crop gland. *J.* Endocrinol. 90: 437-443.
23. Silver, R. and M. Cooper (1983). Avian Behavioral Endocrinology. *Bioscience,* 567-572.
24. Silver, R. (1983). Biparental Care in Birds: Mechanisms controlling incubation bout duration, pp. 451-462. In: *Hormones and Behavior in Higher Vertebrates.* (Ed. R. Gilles), Springer-Verlag: Basel.
25. Silver, R. (1983). Biparental care: Hormonal and nonhormonal control mechanisms, pp. 145-171. In: *Symbiosis in Parent-Young Interactions* (Eds. H. Moltz and L. Rosenblum), Plenum Press.

26. Silver, R. (1983). *Review of*: History of Research in Mammalian Sexual Behavior. D.A. Dewsberry (Ed.) *Mammalian Sexual Behavior: Foundations for Contemporary Research*. Benchmark Papers in Behavior, Vol. 15. Stroudsburg, PA: Hutchinson Ross, 1981, 395 pp.
27. Cooper, M.L., G.E. Pickard, and R. Silver. (1983). Retinohypothalamic pathway in the dove (*Streptopelia risoria*) demonstrated by anterograde HRP. Brain Res. Bull. 10: 715-718.
28. Ball, G. and R. Silver. (1983). Timing of incubation bouts by ring doves (*Streptopelia risoria*). J. Comp. Psychol. 97**:** 213-225.
29. Kahn, R., W. Fifer, and R. Silver (1984). Automatic monitoring of temperature and/or location: A computer-controlled radiotelemetry system. *Behavior Research Methods, Instruments, and Computers*, 16: 533-537.
30. Pickard, G.E., R. Kahn, and R. Silver (1984). Splitting of the circadian rhythm of body temperature in the golden hamster. Physiol. Behav. 32: 763-766.
31. Gibbon, J., M. Morrel, and R. Silver (1984). Two kinds of timing in the circadian incubation rhythm of the ring dove. Am. J. Physiol. 247: R1083-R1087.
32. Silver, Rae and E.L. Bittman. (1984). Reproductive Mechanisms: Interaction of circadian and interval timing. In: L. Allen and J. Gibbon, (eds.), *Timing and Time Perception*, Annals of the New York Academy of Sciences: New York, pp. 488-514.
33. Silver, R. (1984). Prolactin and parenting in the pigeon family. *J. Exp. Zool.* 232: 617-625.
34. Crews, D. and Silver, R. (1985). Nonmammalian mating behavior. In: *Psychobiology of Reproduction.* In: N. Adler, D. Pfaff and R.W. Goy (Eds.). Plenum Press, New York, pp.101-182.
35. Graf, J.S., P.D. Balsam, and Rae Silver. (1985). Associative factors and the development of pecking in ring dove. Developmental Psychobiology, 18: 447-460.
36. Ramsey, S.M., A.R. Goldsmith, and R. Silver (1985). Stimulus requirements for prolactin and LH secretion in incubating Ring Doves. Gen. Comp. Endocrinol. 59**:** 246-256.
37. Silver, R., G. Ball, and H. Andrews (1985). Parental care in ecological perspective: A quantitative analysis of avian subfamilies. Amer. Zool. 25: 823-840.
38. Silver, Rae. (1986). Circadian and interval timing in the ovulatory cycle of the chicken. J. Poultry Sci. 65: 2355-2362.
39. Silver, R, and Rosenblatt, J.S. (1987). The development of a developmentalist: Daniel S. Lehrman. Dev. Psychobiol. 20**:** 563-570.
40. Silver, R. and Norgren, R. (1987). Avian circadian rhythms and behavior. In: *Psychobiology of Reproduction.* D. Crews (Ed.). Prentice-Hall: New Jersey. pp. 120-140.
41. Lehman, M.N., Silver, R., Gladstone, W.R., Kahn, R.M., Gibson, M. and Bittman, E.L. (1987). Circadian rhythmicity restored by neural transplant. Immunocytochemical characterization of the graft and its integration with the host brain. J. Neurosci. 7: 1626-1638.
42. Silver, R , Witkovsky, P., Horvath, P., Alones, V., Barnstable, C. and Lehman, M. (1988). Coexpression of opsin- and VIP-like immunoreactivity in CSF-contacting neurons of the avian brain. Cell Tiss. Res. 253: 189-198.
43. Norgren, R. and Silver, R. (1989) Retinal projections in quail.Visual Neurosci. 3: 377-387.
44. Norgren, R. and Silver, R. (1989) Retinohypothalamic projections and the suprachiasmatic nucleus in birds. Br. Behav. Evol. 34**:** 73-83.
45. Silver, R. and G. Ball (1989). Brain, hormone and behavior interactions in avian reproduction: Status and prospectus.The Condor 91: 966-978.
46. Silver, R. (1990) Avian behavioral endocrinology: Status and prospectus. In: M. Wada (Ed.) *Endocrinology of Birds: Molecular to Behavioral.* Japanese Scientific Society Press, Tokyo and Springer-Verlag, Berlin.

47. Silver, R and Ramos, C. (1990). Vasoactive intestinal polypeptide in avian reproduction. In: *Comparative Physiology,* vol. 8, Hormones, Brain and Behaviour in Vertebrates 1: Sexual Differentiation, Neuroanatomical Aspects, Neurotransmitters and Neuropeptides. (Ed. J Balthazart). Basel:Karger.
48. Norgren, R. and Silver, R. (1990). Distribution of vasoactive intestinal polypeptide, neurophysin and acetylcholinesterase in dove hypothalamus with an emphasis on the question of an avian SCN. Cell Tiss. Res. 259: 331-339.
49. Cloues, R., C. Ramos, and Silver, R. (1990). VIP-like immunoreactivity during reproduction in doves: Influence of experience and number of offspring. Horm. Behav. 24**:** 215-231.
50. Silver, R., Lehman, M.N., Gibson, M., Gladstone, W.R., & Bittman, E.L. (1990). Dispersed cell suspensions of fetal SCN restore restore circadian rhythmicity in SCN-lesioned adult hamsters. Brain Research 525: 45-58.
51. Romero, M-T. and Silver, R. (1990). Time course of peptidergic expression in intact SCN and in age-matched 3rd ventricular SCN grafts. Dev. Br. Res. 57: 1-6.
52. Hakim H.J. A. Philpot and Silver, R. (1991). Circadian locomotor rhythms but not photoperiodic responses survive transection of SCN efferents in hamsters. J. Biol. Rhythms 6: 97-113.
53. Lehman, M.N., Silver, R., and Bittman, E.L. Anatomy of SCN grafts. In: *The Suprachiasmatic Nucleus: The Mind's Clock*. Eds. D. Klein, R.Y. Moore, and S.M. Reppert. Oxford University Press, N.Y. (1991), pp. 349-374.
54. Canbeyli, R. Lehman, M. and Silver, R. (1991). Tracing SCN graft efferents with DiI. Brain Research 554: 15-21.
55. Canbeyli, R.S., Romero, M.T., Silver, R. (1991). Neither triazolam nor activity phase advance circadian locomotor activity in SCN-lesioned hamsters bearing fetal SCN transplants. *Brain* Research 566: 40-45
56. Silver, R. (1992) Environmental factors influencing hormone secretion. In:
57. Balsam P.D., Stephenson J., Silver R. (1992). Operant and Pavlovian contributions to the ontogeny of pecking in ring doves. Dev Psychobiol. 25: 389-410.
58. Silver, R., Ramos, C.L. and Silverman, A-J. (1992). Sex behavior triggers appearance of non-neural cells containing gonadotropin-releasing hormone in doves. J. Neuroendo. 4: 207-210.
59. Ramos, C.L. and Silver, R. (1992). Gonadal hormones influence the timing of parental behavior of doves. Horm. Behav. 26: 283-295.
60. Silver, R., Ramos, C., Machuca, H., Silverin, B. (1992) Immunocytochemical distribution of GnRH in the brain of adult and posthatching Great Tit (*Parus major*) and Ring Dove (*Streptopelia roseogrisea*). Ornis Scandanavia, 23, 222-232.
61. Romero, M-T. Lehman, M.N., and Silver, R. (1993). Age of donor influences ability of SCN grafts to restore circadian rhythmicity. Dev. Br. Res. 71: 45-52.
62. Silver,R. and J. LeSauter. (1993). Efferent signals of the SCN. J. Biol Rhythms 8: (suppl.) 589-592.
63. Silver, R. Saldanha, C.J. (1993). VIP and prolactin in avian reproduction. *Life Sciences. Endocrinology I.* CSRT Trivandrum, India 127-146.
64. Zhuang,X., A-J. Silverman, and R. Silver (1993). Reproductive behavior, endocrine state, and the distribution of GnRH-immunoreactive mast cells in the dove brain. Horm. Behav. 27: 283-295.
65. Silver, R., Zhuang, X., Millar, R. Silverman, A-J. (1993). Mast cells containing GnRH-like immunoreactivity in the CNS during courtship in doves. In: *Avian Endocrinology*, Ed. P. J. Sharp, J Endocrinology Ltd. Press, Bristol. pp 87-98.
66. Silver,R. and J. LeSauter. (1993). What do SCN transplants do? Brain Res. Reviews 18: 322-325.

67. LeSauter, J. and Silver, R. (1993) Heavy water lengthens the period of freerunning rhythms in lesioned hamsters bearing SCN grafts. Physiol. Behav. 54: 599-604.
68. LeSauter, J. and Silver, R. (1993) Lithium lengthens period of circadian rhythms in lesioned hamsters bearing fetal SCN grafts. Biol. Psychiat. 34: 75-83.
69. LeSauter, J. and Silver, R. (1994) Suprachiasmatic nucleus lesions abolish and fetal SCN grafts restore circadian gnawing rhythms in hamsters. Restorative Neurol. and Neurosc.: 6: 135-143.
70. Lehman, M.N. and R. Silver (1994). Restoration of circadian rhythms by neural transplants. In: *Neuronal Transplantation, CNS Neuronal Injury and Regeneration*. (Ed. J. Marwah). CRC Press Inc. pp 141-160.
71. Saldanha, C.J. Deviche. P.D. and Silver, R. (1994) Increased VIP and decreased GnRH expression in photoperiodic Dark-eyed juncos (*Junco hyemalis*). Gen. Comp. Endocrinol. 93: 128-136.
72. Balsam, P. D. and R. Silver (1994). Behavioral change as a result of experience: Toward principles of learning and development. In: *Causal Mechanisms of Behavioral Development.* (Eds. J.A. Hogan and J.J. Bolhuis). Cambridge University Press, Cambridge.
73. Saldanha, C.J., Leak, R.K. and R. Silver (1994). Detection and transduction of daylength in birds. Psychoneuroendocrinology 19: 641-656.
74. Wallman,J. Saldanha, C.J. and Silver, R. (1994) . A putative suprachiasmatic nucleus of birds responds to visual motion. J. Comp. Physiol. 174: 297-304.
75. Serviere, J., Gendrot, G. LeSauter, J. and R. Silver (1994). Host resets phase of grafted SCN: II. Influence of implant site, tissue specificity, and pineal secretions. Neurosc. Lett. 176: 80-84.
76. Serviere, J., Gendrot, G. LeSauter, J. and R. Silver (1994). Host resets phase of grafted SCN: I. A 2-deoxyglucose study of the time course of entrainment. Brain Res. 665: 168-176.
77. Silverman, A-J., Millar, R.P., King, J.A., Zhuang, X., and Silver, R. (1994) Mast cells with gonadotropin-releasing hormone-like immunoreactivity in the brain of doves. PNAS, 91: 3695-3699.
78. Knapp, R. and R. Silver (1995). Site of origin of neurons projecting to the stalk-median eminence in ring doves (*Streptopelia roseogrisea*). Cell Tiss Res. 280: 77-86.
79. Silver, R., Zhuang, X., and Silverman, A-J. (1995) Immunocompetence, mast cells and sexual behavior. Ibis 138: 303-328.
80. Lehman, M., LeSauter, J., Kim, C., Berryman, S., Tresco, P., Silver, R. (1995) How do fetal grafts of the SCN communicate with the host brain? Cell Transplantation 4: 75-81.
81. Silver, R. and C.J. Saldanha (1996). Intraventricular prolactin inhibits hypothalamic vasoactive-intestinal polypeptide-expression in doves. J. Neuroendocrinol. 7: 881-887.
82. Silverman, A-J., Zhuang, X., and Silver, R. (1995) Central nervous system mast cells and reproduction. In: The Neurobiology of Puberty. (Ed. T. Plante), The Journal of Endocrinology Ltd. Bristol, England.
83. LeSauter, Lehman and Silver (1996). Restoration of circadian locomotor rhythms by transplants of SCN "micropunches" J. Biol. Rhythms 11: 163-171.
84. Silver, R., M-T. Romero, H.R. Besmer, R. Leak, J.M. Nunez and J. LeSauter (1996). Calbindin-D28k cells in the hamster SCN express light-induced Fos. NeuroReport 7: 1224-1228.
85. Silver, R., Silverman, A-J., Vitkovic, L., and Lederhendler, I. (1996) Mast cells in the brain: Evidence and functional significance. Trends in Neurosciences: 19: 25-31.
86. Silver , R., J. LeSauter, P. Tresco, and M.N. Lehman and (1996). A diffusible coupling signal form the transplanted suprachiasmatic nucleus controlling circadian locomotor rhythms. Nature 382, 810-813.

87. Silver, R., LeSauter, J., and Lehman, M.N. Contributions of SCN transplant studies to understanding the biological clock. In: Evolution of Circadian Clock (Eds. T. Hiroshige & K. Honma). Hokkaido U. Press, Sapporo. 1996.
88. Zhuang, X. A.-J. Silverman and R. Silver (1996) Brain mast cell degranulation regulates blood-brain barrier. J. Neurobiol. 31: 393-403.
89. Caba, M., R. Silver, G. Gonzalez-Mariscal, A. Jimenez and C. Beyer (1996). Oxytocin and vasopressin immunoreactivity in rabbit hypothalamus during estrus, late pregnancy and postpartum. Brain Research 720: 7-16.
90. Zhuang, X. A.-J. Silverman and R. Silver (1997) Mast cell number and maturation in the central nervous system: Influence of tissue type, location, and exposure to steroid hormones. Neuroscience, 80: 1237-1245.
91. LeSauter, J., Romero, P., Cascio, M., and Silver, R. (1997) Attachment site of grafted SCN influences precision of restored circadian rhythm. J. Biol. Rhythms 12:327-338.
92. LeSauter, J. and Silver, R. (1998). Output signals of the SCN. Chronobiology International 15: 535-550.
93. Moore, R.Y. and Silver, R. (1998). Suprachiasmatic nucleus organization. Chronobiology International, 15: 475-487.
94. Silver, R. and Moore, R.Y. (Guest editors) (1998). The suprachiasmatic nucleus and circadian function: An introduction. Special Issue in SCN: Editorial foreword for Chronobiology International, 15: (vii-x).
95. Lehman, M., LeSauter, J. and Silver, R. (1998) Fiber outgrowth from anterior hypothalamic and cortical xenografts in the third ventricle. J. Comp Neurol. 391: pp. 133-145.
96. Shanas, U., Bhasin, R. Sutherland, A.K., Silver, R. (1998) Brain mast cells lack the c-kit receptor. J. Neuroimmunology 90: 207-211.
97. Zhuang, X., A.-J. Silverman, and R. Silver. (1999) Distribution and local differentiation of mast cells in the parenchyma of the forebrain. J. Comp. Neurol. 408: 477-488.
98. LeSauter J. and Silver, R. (1999) Localization of an SCN subnucleus regulating locomotor rhythmicity. J. Neurosc. 19: 5574-5585.
99. Silver, R. and Silverman, A-J. Sex and Brain secretions. In: Reproduction in Context. Eds. K Wallen and J. Schneider. MIT Press, Boston (1999).
100. LeSauter, J., Stevens, P., Janssen H., Lehman, MN, and Silver, R. (1999). Calbindin expression in the hamster SCN is influenced by genotype and by photic conditions. NeuroReport 10: 3159-3163.
101. Silver, R., Sookhoo, A.I., LeSauter, J., Stevens, P. Jansen H.T., Lehman, M.N. (1999) Multiple regulatory elements result in regional specificity in circadian rhythms of neuropeptide expression in mouse SCN. NeuroReport 10: 3165-3174.
102. Deviche, P., Saldanha, C.J., and Silver, R. (2000) Changes in brain gonadotropin-releasing hormone and vasoactive intestinal peptide-like immunoreactivity in male dark-eyed juncos (junco hyemalis). Gen. Comp. Endocrinol. 117(1): 8-19.
103. Wilhelm, M. King, B., Silverman, A-J., Silver, R. (2000) Gonadal steroids regulate the number and activational state of mast cells in the medial habenula. Endocrinology 141: 1178-1186.
104. Silverman, A-J. Sutherland, A.K., and Silver, R. (2000). Mast cells migrate from blood to brain. J. Neurosci. 20: 401-408.
105. Caba, M., Pau KY, Beyer C, Gonzalez A., Silver R., and Spies HG. (2000) Coitus-induced activation of c-fos and gonadotropin-releasing hormone in hypothalamic neurons in female rabbits. Brain Res. Mol. Brain Res. 78(1-2): 69-79.
106. Lehman MN and Silver, R (2000) CSF Signaling in Physiology and Behavior. In: (Eds. Fuxe, Nicholson) Progress in Brain Research Vol 125. Ch 27: pp409-427.

107. Bryant, D. N., LeSauter, J., Silver, R. and Romero, M-T. (2000) Retinal innervation of calbindin cells in the hamster suprachiasmatic nucleus: Ultrastructural characterization. J. Biol. Rhythms. 15(2): 103-111.
108. Saldanha, C.J., Silverman, A-J., and Silver, R. (2001) Direct Innervation of GnRH Neurons by Encephalic Photoreceptors in Birds. J Biol Rhythms 16(1): 39-49.
109. Silver, Rae and Kriegsfeld, L. (2001) Environmental Factors influencing hormone secretions in humans and animals. In: *Behavioral Endocrinology*. J. Becker, S. M. Breedlove, and D. Crews (Eds.) MIT Press, Cambridge, Mass.
110. Gabriel, R., LeSauter, J., Silver, R. and Witkovsky, P. (2001) Diurnal and circadian rhythms in the expression of protein kinase C immunoreactivity in the rat retina J. Comp. Neurol. 439:1 40-50.
111. Kriegsfeld, L., LeSauter, J., Hamada, T., Pitts, S., and Silver, R. Circadian Rhythms in the Endocrine System. In: *Hormones, Brain and Behavior*. Ed. D. Pfaff. Academic Press (2002).
112. Hamada, T. Lesauter, J., Venuti, J. Silver, R. (2001). Expression of *Period* genes: Rhythmic and non-rhythmic compartments of the Suprachiasmatic Nucleus. J. Neurosci. 21:7742-50.
113. Hamada, T. LeSauter, J. Lokshin, M. Romero, M-T. Yan, L.Venuti, J. Silver, R. Identification of a circadian mechanism for gating sensory input to the brain. Submitted.
114. Kriegsfield,L.J., LeSauter,J. Yackulic, C.B. and R. Silver Topographical organization of suprachiasmatic nucleus projections in golden hamsters (*Mesocricetus auratus*): I Anterograde analysis. Submitted.
115. Leak R.K., J LeSauter, R. Silver, and R.Y. Moore. Topographical organization of suprachiasmatic nucleus projections in golden hamster (*Mesocricetus auratus*): II Retrograde Analysis. Submitted.
116. Nelms, J.L., LeSauter J, Silver R. and Lehman M.N. Biotinylated dextran amine as a marker for fetal anterior hypothalamic grafts and their efferents. Experimental Neurol. In press.
117. LeSauter, J., L. J. Kriegsfeld, J. Hon and R. Silver. $Calbindin_{d28k}$ cells make selective contacts with other SCN neurons. Neuroscience. in press.
118. Asarian, L., E.Yousefzadeh, A-J. Silverman and R Silver (2002) Stimuli from conspecifics influence brain mast cell population in male rats. Hormones and Behavior (in press).

Educational Publications

119. Balsam, P., W. Fifer, S. Sacks and R. Silver (1984). Microcomputers in psychology laboratory courses. *Behavior Research Methods, Instruments and Computers* 16: 150-152.

120. Saldanha, C. and Silver, R. Hormones. In: (Eds.) G. Greenberg & M. Haraway, Comparative Psychology: A handbook. Garland Publishing, New York. Pp304-312.

121. Le Sauter, J. and Silver, R. Circadian rhythms. In: (Eds.) G. Greenberg & M. Haraway, Comparative Psychology: A handbook. Garland Publishing, New York. P 277-281.

122. Chipman, S.F. Krantz, D.H. and Silver, R. (1992) Mathematics anxiety and science careers among able college women. *Psychological Science* 3: 292-295.

123. Chipman, S.F. Krantz, D.H. and Silver, R. (1995) Math anxiety/confidence and other achievements. In: Gender and mathematics education. Lund University Press. Pp 113-120.
124. Silver, R and Kriegsfeld, L. (2001) Hormones and Behavior. In: Encyclopedia of Life Sciences. Nature Publishing Group, Hampshire, UK, pp.1-10.

Movies and television appearances:

(Television) 1997 Played myself in the Comedy Central Show on Circadian rhythms. With Whitney Brown.

(Television) 1999 Played myself in the Comedy Central Show on the bioethics of animating mannequins; with Vance Degeneres.

(Film) Research on circadian rhythms in doves and in hamsters, a sequence filmed for: Rhythms and Moods, In: "The Mind" (Producer, Martin Freeth) BBC. (Produced by BBC) 1988

(Film) The Reproductive Behavior of the Ring Dove. A 20 minute classroom film. Funded by NSF 1981. This film won 2nd prize at the Animal Behavior Society, 1985.

(Film) The Dove Story: One hour film produced for Mike Mansfield, Executive Producer at NOVA.1980 funded by NSF and NOVA.

(Film) Research on Circadian rhythms was filmed for a BBC production for the Discovery Series show on Circadian rhythms. Air dates Jan 1999.(Britain) July 1999 (USA)

1987: Panel on Mathematics education at Oberlin College
1995: Bank Street School for Children: Careers for Scientists Panel Member

Invited Addresses and Symposia (limited to recent years)

2002

University of Michigan, February
University of Texas at College Station, March
University of Alaska, Fairbanks (July 2002)
University of Virginia, Center for Biological Timing (January)
NIMH workshop on "The Effects Of Psychological Variables On The Progression Of HIV Disease" January 2002).
Universite de Tours Ecole Doctorale, Tours, France,June 2002
Andechs Germnany Summer School Lecture, September
Japanese Society for Chronobiology (November 2002)
University of Sapporo (November)
New York University Biology Department (June)

2001

University of Alaska, Fairbanks First Annual Neuroscience Program (July 2001), American Academy of Sleep Medicine, Chicago (June 2001); Keystone symposium on

Biological Clocks (March 2001). Society for Behavioral Neuroendrocrinology (June 2001). Japanese Neuroscience Meeting, Clock symposium and Molecular Clock symposium (September 2001)

2000

University of Fairbanks, Alaska; Oregon State Health Sciences University, Oregon, Health Sciences Center; Society for Research in Biological Rhythms, Jacksonville, FL.; Department of Neonatology, Columbia Health Sciences; Dartmouth University Medical School, Dartmouth Symposium for the Life Sciences

1999

University of Delaware; Department of Anatomy and Cell Biology, CPMC; Sleep and Vigilance at the American Physiological Society – Fort Lauderdale, Miami; Workshop on steroid hormones and brain function, Breckenridge, CO April; Williams College, February; Hamilton College, March; Gordon Research Conference, Barga, Italy; Institut National pour Recherche Agricole, Nouzilly, France, June; Annual National Institute on the Teaching of Psychology, Jan 1999; Biology Department, Puerto Rico

1998

New York State Psychiatric Institute, Department of Psychiatry December 1988
City College, Biology Department, November, 1998
Workshop: Organized with Michael Lehman, "The CSF as a communication pathway of the brain". Society for Neuroscience Meeting; Nov. 1998
University of Pennsylvania, January 1998
University of Houston, February 1998
New York University, March 1998
American Society for Neurochemistry, Denver Colorado, March 1998
NYU Post-graduate-Medical School and New York Neuropsychology Group, May 1998
Society for Research in Biological Rhythms May 1998
Society for Behavioral Endocrinology Atlanta, June, 1998
INRA, Nouzilly, France June 1998
University of Vera Cruz, Vera Cruz, Mexico July 1998

1997 Brookhaven National Laboratory, Department of Medicine April 1997
Department of Neurosciences at Concordia University - February 1997
NSF-CNRS Conference: Biological Rhythms: Physiological and Molecular Mechanisms
NSF-NIH panel on immune-neuroendocrine interactions-March 1997,
University of Maryland, Baltimore - April, 1997
University of Massachusetts Neuroscience Seminar Series April, 1997
Georgia State University, Atlanta Georgia May, 1997
International Society for Chronobiology Paris, France 1997
Gordon Conference on Chronobiology, August, 1997
Distinguished Visiting Speaker Laboratory of Neuroendocrinology, Brain Research Institute, U.C.L.A. June 1997

1996

Department of Anatomy and Cell Biology, Columbia College of Phsyicians and Surgeons
University of Cincinnati, School of Medicine. Cincinnati, Ohio

Human Frontiers Conference: Photic control of Seasonal Cyclicity - Lyons, France. May, 1996
International Conference on the study of Hormones, Brain and Behavior, Turin, Italy, August, 1996
Society for Research on Biological Rhythms June 1996
American Association for the Advancement of Science, Baltimore Speaker and Co-chair for symposium : The Mind's Clocks-Circadian and Interval Timing Mechanisms, Baltimore. February

1995

Sapporo Symposium on Biological Rhythms. Symposium on role of the SCN in Circadian Rhythmicity. - Sapporo, Japan.
Toya Conference, Toya National Park, Japan. Symposium on Biological Rhythms.
Discussant: Panel on GnRH neurons. Conference on reproductive behavior- Boston
American Physiological Society Symposium-Rapporteur on Cellular Basis of Biological Clocks, Hanover, NH
Keystone Symposium on encapsulation of biological tissue for transplantation. Frisco, Colorado.
American Psychological Association, invited address on brain-immune interactions, N.Y.
Hunter College

1994

Organizer and speaker, NIMH workshop on Mast Cells, Washington, D.C.
Plenary Speaker, International Ornithological Union, Vienna, Austria
Society for Research on Biological Rhythms, Participant in Workshop on photoreception and Session Chair, of "Ontogeny of the SCN", FLA.
Conference on Reproductive Behavior-invited symposium speaker.
Society for Neurosciences, Chair of Social event for Behavioral Neuroendocrinology
Biology Department, Brooklyn College
Biology Department- Columbia University
University of Tlaxcala, Mexico

1993

Gordon Conference on Biological Timing, Vermont
Conference on Hormones, Brain and Behavior, Tours, France
World Conference of Sleep Research, Hawaii
Neuroscience Program, Johns Hopkins University
Neuroscience Program & Biology Department, University of Washington, Seattle
Department of Anatomy and Cell Biology, Columbia Universtiy School of Medicine
Neurosciences Program, Princeton University

1992

Conference on Circadian Rhythms - Fondation pour L'Etude du Systeme Nerveux Central et Peripherique
Neurosciences Department, University of Connecticut
Biology Department, Wellesley College
Biology Department, Cornell University
Albert Einstein School of Medicine; Neurosciences Program
Michigan State University

Vth International Avian Endocrinology Conference, Edinburgh
NSF Science and Technology Center for the Study of Biological Timing, University of Virginia at Charlottesville.

1991

Visiting lecturer, Guadalajara, Mexico
Gordon Research Conference, Irsee, Germany
20th International Conference on Chronobiology, Tel Aviv, Israel-Session chairman and speaker
INRA, Laboratoire de Physiologie Sensorielle, Jouy-en-Josas, France
100th Anniversary celebration of the University of Goteborg, Session chairman and organizer, Goteborg, Sweden
Visiting Professor, University of Tlaxcala, Tlaxcala, Mexico
European Winter Brain Conference on Endocrine and Peptidergic Control of Sexual Behavior, Crans-Montana, Switzerland
Biobehavioral Research Center, Bloomington, Indiana
Mount Sinai School of Medicine, Department of Medicine
Columbia University Biology Department
Rockefeller University Field Research Center

1990

Developmental Psychobiology Meeting, Session chair and speaker, Puerto Rico
Society Biological Rhythms, Florida
New York State Department of Psychiatry
Psychology Department, Binghamton, NY.
Society for Research in Biological Rhythms, Fla.
Biology Department- State University of New York at Albany
Neurosciences Program-University of Illinois at Champaign
Psychology Department- Concordia University
Biology Department, Neuroscience Colloquium - City University of New York
Department of Biology- Rutgers University, New Brunswick.

Occasional Reviewer (partial listing)

Association of Women in Science Educational Foundation, City University Research Foundation; National Research Council of Canada, Canadian National Medical Research Council, NIMH - Fellowship Program, NIH - RCDA Program, NIH – Center for Scientific Review, Ontario Mental Health Foundation, National Science Foundation

Aggression, Animal Behaviour, Biol. Reproduction Condor, Gen. Comp. Endocrinology, Developmental Psychobiology; Little, Brown and Co, Hormones and Behavior, Harper and Row, Journal of Comparative and Physiological Psychology, Neurosciences, Journal of Neuroscience, Journal for Research in Biological Rhythms, Physiology and Behavior, Pharmacology, Science

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